which enable me to invite any person who may wish to make themselves acquainted with the *modus operandi* by actual inspection, to come and witness the same. The only formality I would impose is the communication of the visitor's card and address, and a few hours' notice, in case the intended visit should promise to be inopportune. To reduce the likelihood of this I would intimate that the regular observations are made (in the present case) within about half an hour before and after the hours of six and twelve, morning, noon, evening, and midnight, during which the attention of the observer may be understood to be entirely preoccupied. At any other hour of the day or night, either I or my assistant will be desirous of explaining to the best of our ability whatever may be needful.

My reasons for making this offer so publicly are, in the first place, entirely scientific. I wish to give those who are curious on the subject a fair opportunity, and I hope to derive information or suggestions from those whose attention is for the time engaged in comprehending the details by means of which the general result is sought to be obtained. Beyond this, I am also desirous of obtaining some indications as to the degree of interest actually existing in England on the subject of gravity-measures of this kind.

The present site has a peculiar interest. It is a cellar which I have been lucky enough to find very near the desired spot—which is that which was occupied in the early part of this century by Kater, Sabine, Foster, and others; but was afterwards necessarily abandoned on the decease of Mr. Browne, of Portland Place, whose house was the *rendezvous* of those observers. It was in consequence of this abandonment that the intention was formed of founding a more permanent central point of reference; and as the establishment of a magnetical observatory at Richmond was at that time under consideration, the transfer of what may be called the English home of pendulum investigations from Portland and Tavistock Places to the new Richmond (or "Kew") Observatory was decided upon, and accordingly when next pendulum experiments were instituted, their site was in the Richmond Observatory. It is only recently, however, that the necessity of ascertaining the physical relation between the two sites has become a practical one.

Something of the same sort had been experienced in the earlier days, when, partly owing to Greenwich Observatory having formed the base or *point d'appui* on English soil, of one or two foreign series of operations; partly because of the obvious anomaly of having the principal English pendulum station in a private house; special observations were instituted for determining the relation of that site to the Greenwich one. Greenwich was thus incorporated on the one hand with those series which depended on the Portland Place site, while the latter was connected with those dependent (if one may use the term where all are mutually dependent) on the Greenwich site. They were all, in fact, to a certain extent linked together.

This should explain why re-observation at Greenwich, in connection with re-observation at Kew, seems likely to meet the present want best if supplemented by re-observation also at, or very near, the old Portland Place site. I have made the requisite observations (subject to some doubt) at Kew, *i.e.* at the Richmond Observatory, and at Greenwich Observatory, and I am now doing the same in the cellar above referred to, as representing Portland Place. Its exact situation is immediately in rear of All Souls' Church, Langham Place.

The Kew (or Richmond) Observatory is not a very convenient place for observations of this nature. They require attendance at all hours, whereas the observatory is situated so far from the inhabited part of Richmond as to permit of such attendance only at great personal inconvenience.[1] Also, though a precise knowledge of time is of the first importance, the absence of telegraphic communication with Greenwich Observatory and the distance from the nearest telegraph station combine at Kew to make one dependent on local transits. This is of itself a very serious objection. If to this we add that the pendulum-room at the Kew Observatory is too small to allow of the introduction of any portable stand or framework such as must of necessity be used on voyages—the very restricted space being permanently occupied by a fixed support, which does not admit of the same dispositions as would be made elsewhere for convenient observations, it remains a serious question whether Kew ought to continue to be regarded as the fundamental English pendulum station. There can be very little doubt, having regard to the paramount importance of *time* in pendulum experiments, that the fundamental station should have a perfect command of that element, such as can rarely be obtained except at a fixed astronomical observatory.

At the Langham Cellar, after due consideration, I have concluded to rely on Greenwich alone for time; sending a chronometer for the purpose every day. So far, the plan seems to be quite satisfactory, being more reliable than noting a transmitted signal at the nearest post-office.

Although I do not think I have touched on any point in this letter which is not closely connected with its primary object, I must nevertheless apologise for its length. In conclusion I have now only to repeat the offer with which I commenced it, that any one interested in, or desirous of becoming practically acquainted with pendulum swinging of this particular kind, may, at any time within the next fortnight, visit and inspect the apparatus in action, by communicating with me, at the address here given.

J. HERSCHEL

1, Langham Street, Portland Place, W., December 28

[1] I estimate that I walked fully 200 miles to and from my work, in all weathers and at all hours, while carrying on the observations at Kew in September and October last.

Dante and the Southern Cross

". . . vidi quattro stelle
Non viste mai, fuor ch'alla prima gente."
Purg. i. 23.

No one will accuse me of excessive patriotism when I say that Dante was one of the very few chosen spirits of the fourteenth century who were thoroughly acquainted with all natural phenomena, so far as they were then known and understood, whilst he was perhaps the only one who manifested a decided contempt for all the pretensions of astrologists and necromancers (Inf. xx.). The words of such a man are deserving of the best consideration, alike of literary and scientific men; it is therefore to be hoped that before the discussion ends those best qualified to speak will throw more light on the lines in question.

As yet in answer to the query which appeared in NATURE (vol. xxv. p. 152), we have only had a quotation of a well-known passage from Humboldt's "Cosmos," and the suggestion that Dante must have derived his knowledge of the Southern Cross—evidently indicated in the lines at the head of this note—from Arabian Globes—a suggestion which, by the way, is expressed, or clearly implied, in the "Cosmos," within a page from the passage quoted. As to the remark with which both Mr. Walker and Mr. Wilks end their notes (NATURE, vol. xxv. p. 173) that "prima gente" does not refer to Adam and Eve, but to the early races which inhabited Europe and Asia, though not new, it is obviously correct to the mind of those who know how great was the cosmographic knowledge of Dante. Yet, as Count de St. Robert states in an ably-written pamphlet on the point in question (Torino, 1866), strange to say, Humboldt (who has so unhesitatingly stated the opinion of Dr. Galle that in 52° 30′ north latitude in consequence of the precession of the equinoxes, the Southern Cross might have previously reached more than 10°, and that it began to become invisible in that latitude 2900 years before Christ), believed that "prima gente" referred to our first parents.

Now, whilst admitting as possible that Dante obtained his knowledge of the stars which form the Southern Cross from the catalogue of Ptolemy (Almagest, Book vii.), on reading the passage, in which occur the two lines quoted above, especially in the original, one is irresistibly brought to think that Dante's enthusiastic description of the "quattro stelle" was inspired by the vivid description of a Christian witness of the glorious spectacle. The person most likely to have imparted such knowledge to the great poet was Marco Polo. That celebrated Venetian traveller returned from his last voyage in 1295, and lived in his native town till 1324 (Col. Yule, "The Book of Ser Marco Polo"). Dante did not visit Venice till 1320, after he had finished his "Divina Commedia," but there are many reasons for the belief that the two great men met or corresponded together.

With regard to the lines:—

". . . quelle tre facelle,
Di che 'l polo di qua tutto quanto arde."
Purg. viii. 89.

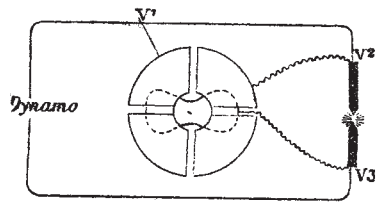
which Dante says were high when the "quattro stelle" were low, it is difficult to agree with any of the commentators, because neither the Magellanic clouds, nor Achernar, nor any three prominent southern stars, correspond satisfactorily to the "tre facelle" alluded to. It must not be forgotten that accurate

astronomical and geographical knowledge is but of recent date, and, as already stated, Dante formed many of his cosmographic conceptions chiefly from hearsay. N. PERINI

The Horse-Power given to any Part of a Circuit by Intermittent Light

SOME time ago, with Prof. Ayrton, I designed and constructed an instrument to measure the horse-power given electrically to any incandescent or arc lamp, or to any part of a circuit, an improvement on the instrument previously devised by M. Deprez; the pointer of a suspended coil moves at once to a mark on a scale which tells the horse-power. The instrument is dead beat, and, what is very important, by a special commutator arrangement it can be calibrated with much smaller forces than it is intended to measure. The current in the suspended coil is proportional to the difference of potential at the ends of a part of the circuit, and the fixed current which causes its deflection is the total main current in the circuit, so that the deflection represents the product of these two factors. The instrument was described at the Society of Arts in March last, and was exhibited at the British Association meeting at York. It will, however, necessarily only work accurately with non-reversed currents because of the self-induction of the suspended coil of fine wire, and it is very important to be able to make the same measurement for reversed currents.

At the Electrical Congress at Paris, soon after the reading of M. Joubert's paper, in which he showed how to measure the mean value of the square of the difference of potential at two ends of a part of a circuit in which reversed currents are flowing, Prof. Ayrton described to me a method of performing the measurement of the horse-power for reversed currents which seemed to have suggested itself to him and to Prof. Fitzgerald of Dublin simultaneously when hearing M. Joubert's paper. It was this: Let there be three points in the circuit at potentials V_1, V_2, V_3,



at any instant, and let there be a known resistance R (with no self-induction) between V_1 and V_2. Let V_3 be connected with the needle of a Thomson's electrometer, and let V_1 and V_2 be connected with the quadrants, V_1 being also connected with the outside of the Leyden jar: then the deflection of the needle measures the mean value of

$$(V_2 - V_1)\left(V_3 - \frac{V_2 + V_1}{2}\right).$$

Now let the needle and a pair of quadrants be connected with V_2, the other pair with V_1, and we measure the mean value of the square of $(V_2 - V_1)$. The difference of these measurements is easily seen to be R times the expended energy which we want to know.

I was not present when Professors Ayrton and Fitzgerald communicated their idea to one another, but immediately afterwards Prof. Ayrton explained it to Sir William Thomson and to me together, making sketches of the necessary connections. Sir William thought well of it, but feared that perhaps the present quadrant electrometer would not be sensitive enough for the measurements. We suggested, however, the use of our multireflex arrangement (see *La Lumière Electrique*, October 5, 1881) for creating greater sensitiveness, and as he was pleased with the idea, we have, since that time, in our very short intervals of leisure, been trying to arrange an electrometer which shall be sensitive enough for the purpose.

I observed to-day that M. Potier in the October number of the *Journal de Physique* publishes the same idea, and I wish to place it on record that the fundamental idea of the new process, which seems to me very feasible and of considerable practical importance, occurred to Messrs. Ayrton, Fitzgerald, and Potier independently. JOHN PERRY

Talgarth Road, West Kensington, December 6

The New Red Star in Cygnus

THE above star, which I found on the 22nd of May last, and which then appeared of the 9th magnitude, and reached 8 m. on June 8, seems now no more than 12 m. Estimations of very small magnitudes are, of course, very difficult, but I believe I am not under the mark in saying 12 m., as I found the star not easy with a 4½-inch O.G. At the same time its deep crimson seemed very striking by glimpses, and in its present state it is, perhaps, the smallest among the stars whose red colour has been observed. It will probably have to be classed among the most remarkable variables. J. BIRMINGHAM

Meteor

TAKING a look at the eclipse of the moon on December 5, about 5.44 p.m., I happened to see a meteor that is, I think, very noteworthy, though, perhaps from distance, its apparent size was so small that I might have scarcely seen it but for the temporary lessening of the light of the moon. Its motion was, throughout its visible course, horizontal and slow. When it met my eyes, it was just below the Pleiades. I followed its flight to the northern end of the eastern sky; there it seemed to go on out of my sight, without fall or collapse: for aught I know, I might have observed it even from the extreme south, had my eyes been turned thither at the outset; I would draw attention to this fact, as well as to its horizontal motion and its seemingly slow progress. The grandeur of the glories displayed by that night's clear sky was at its height as this mysterious stranger passed above our winsome satellite—then a thing of "eerie beauty," its glistening golden ring half-clasping, like "the old moon in the new moon's arms," the earth-shadowed orb over it, and the latter shimmering with the maroon ember-like sheen called by the French *la lumière cendrée*.

JOHN HOSKYNS-ABRAHALL

Combe Vicarage, near Woodstock, December 16

SEA-SICKNESS.—This must be declined as a subject for correspondence.

A NEW ELECTRICAL STORAGE BATTERY[1]

THE great utility of some thoroughly practical method of conserving electric force has caused a great deal of attention to be applied to the subject; no system of electric supply can be considered as perfect until some means is used to so store the force generated that it may be drawn off equally and regularly, and this whether the generator be on or off. If we take, as an example of electric supply, the present systems of electric lighting, it is at once seen, should an accident or stoppage take place in the machinery generating the current, the whole of the apparatus such as lamps or motor-machines are influenced; should there be a reservoir of electricity between the generator and the apparatus of whatever sort for utilising the force this inconvenience would not occur.

All the present systems of storing electricity depend on certain chemical changes produced by electrolysis.

I have gone through a long series of experiments on storing electricity and made many forms of cells, one being a porous pot containing dilute hydric sulphate and a sheet of lead, in an outer vessel containing a sheet of lead in solution of acetate of lead, the plate in the porous pot being made the positive electrode; this cell had the power of storing electricity, by peroxidising the positive electrode, and depositing from the acetate of lead solution metallic lead on the negative electrode, the hydrogen having combined to form acetic acid. On discharging the peroxide is reduced, and the oxide formed during discharge on the other plate dissolves in the acetic acid, forming the original solution of acetate of lead; by this means I eliminated the injurious effects of the hydrogen on charging.

During my experiments I found that red oxide of lead is a very bad conductor of electricity, and the peroxide a good conductor. I also discovered that by amalgamating lead plates with mercury a marked increase was

[1] "On a New Electrical Storage Battery." By Henry Sutton (Ballarat Victoria). Communicated to the Royal Society by the President.